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Noon

(54) **PROTECTIVE UPPER FOR ARTICLE OF FOOTWEAR**

(71) Applicant: **NIKE, Inc.**, Beaverton, OR (US)

(72) Inventor: **Rachael M. Noon**, Portland, OR (US)

(73) Assignee: **NIKE, Inc.**, Beaverton, OR (US)

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CPC *A43B 23/0205* (2013.01)

(57) **ABSTRACT**

An article of footwear includes an upper formed of a first material, and an armor system including a shroud covering a forefoot region of the upper. The shroud includes an articulable shroud vamp having a plurality of overlapping lames arranged in series along a ball portion of the shroud, each of the lames being formed of a second material having a greater hardness than the first material. The shroud may include a toe cap covering a toe portion of the upper and a saddle covering a mid-foot portion of the upper. The shroud vamp is disposed between the toe cap and the saddle. The saddle and the toe cap may be formed of the second material. The second material may be an up-cycled polyethylene composite.

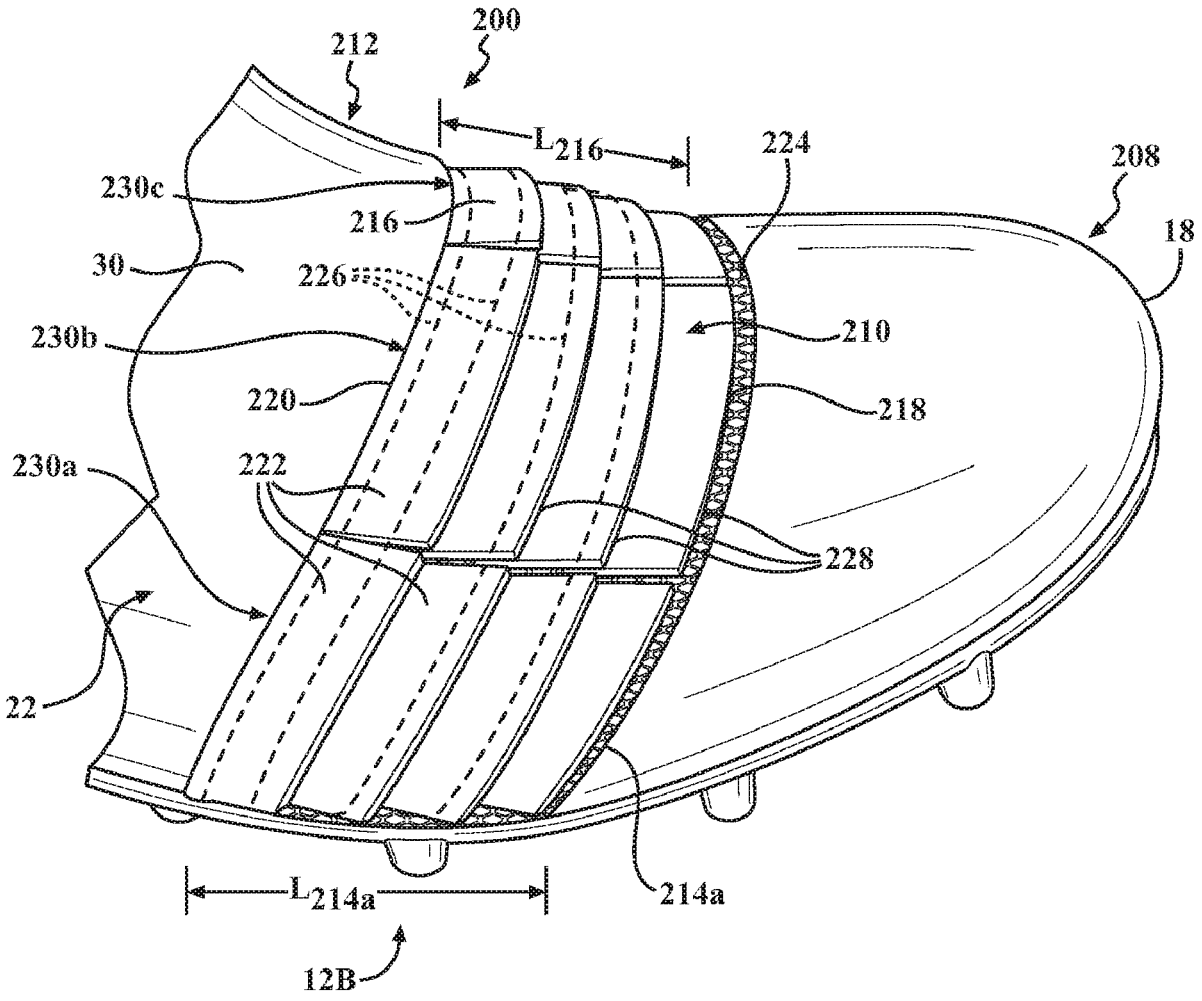
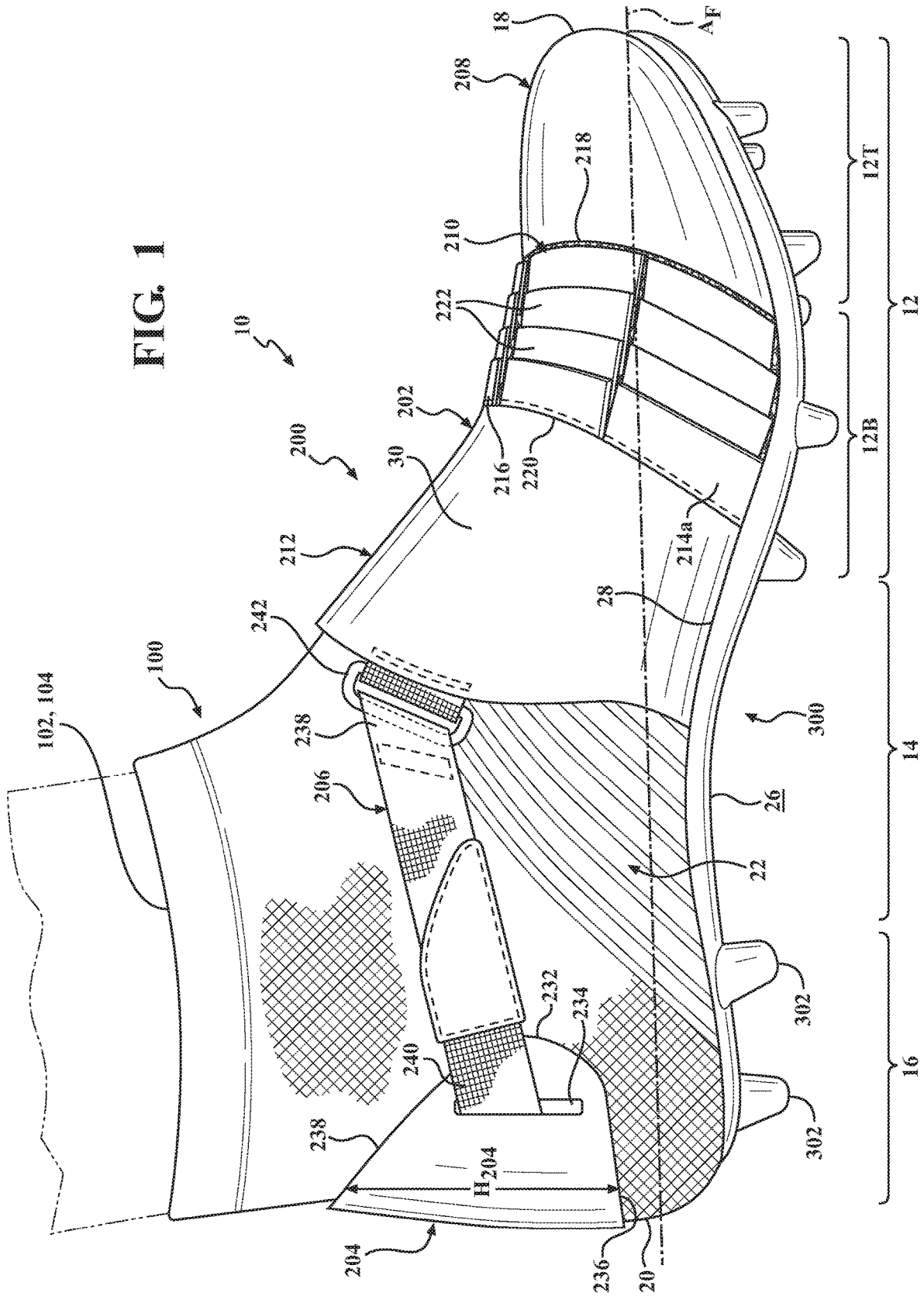


FIG. 1


10
100
102, 104
200
202
204
206
208
210
212
214a
216
218
220
222
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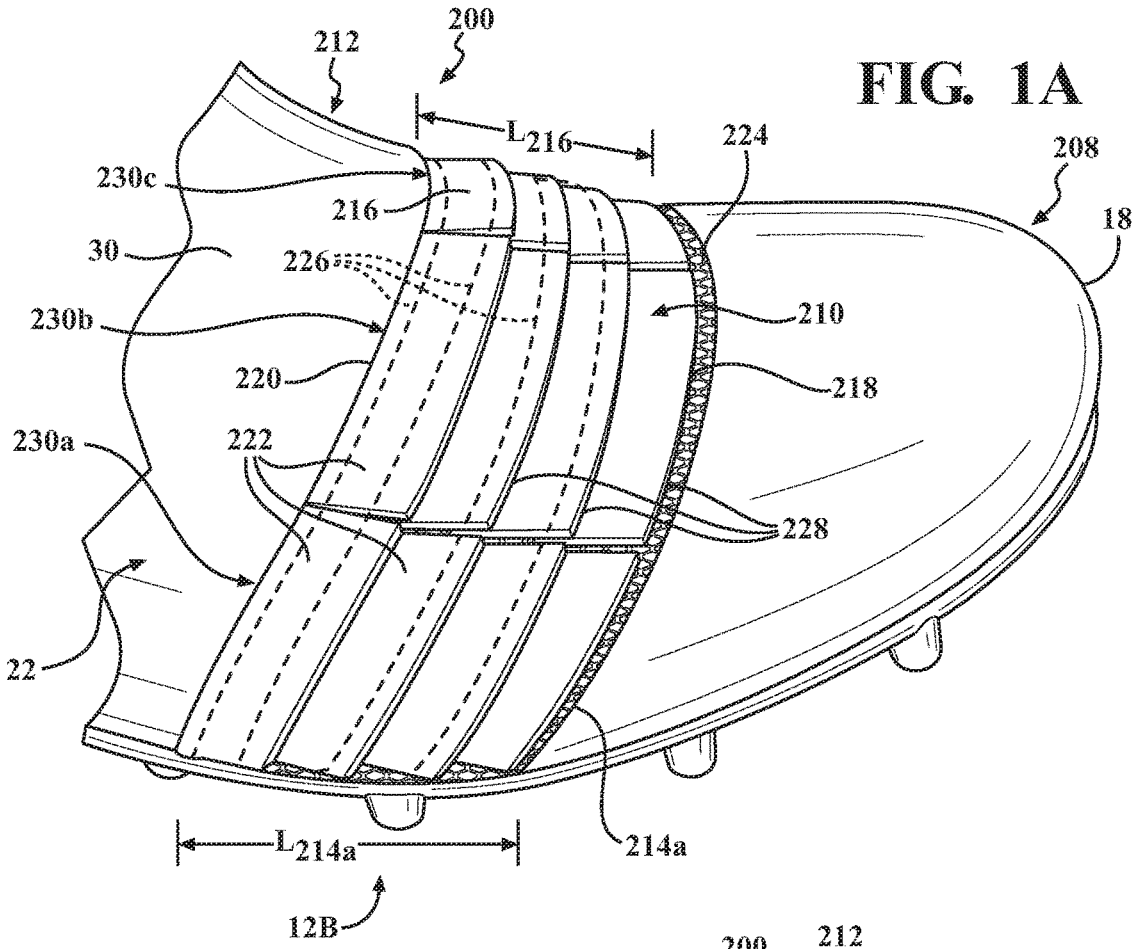
240
242
18
A_F
12T
12B
12
14
16
26
28
30
300
302
232
234
236
20
22
H_{204}

FIG. 1A


212
200
L_{216}
224
208
230c
216
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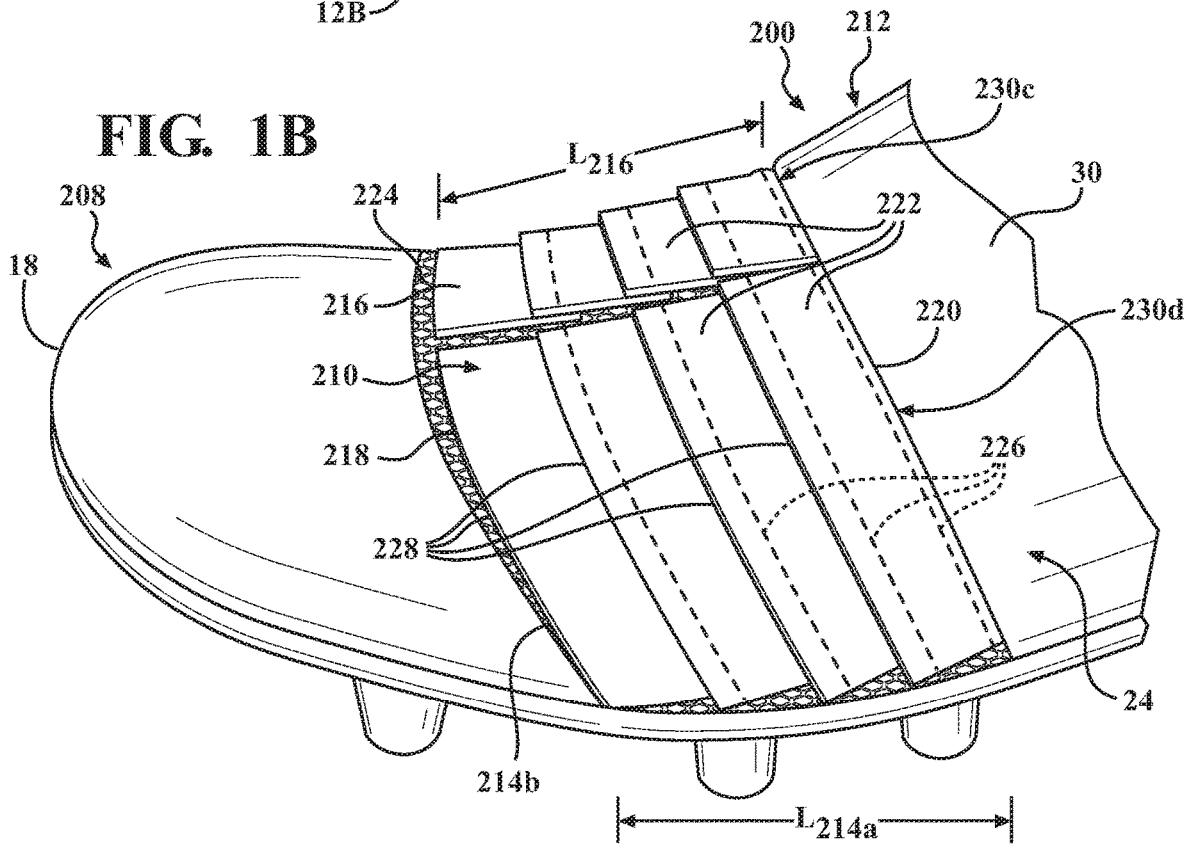
226
230b
210
220
218
230a
222
228
22
L_{214a}
214a
12B

FIG. 1B


200
212
230c
L_{216}
30
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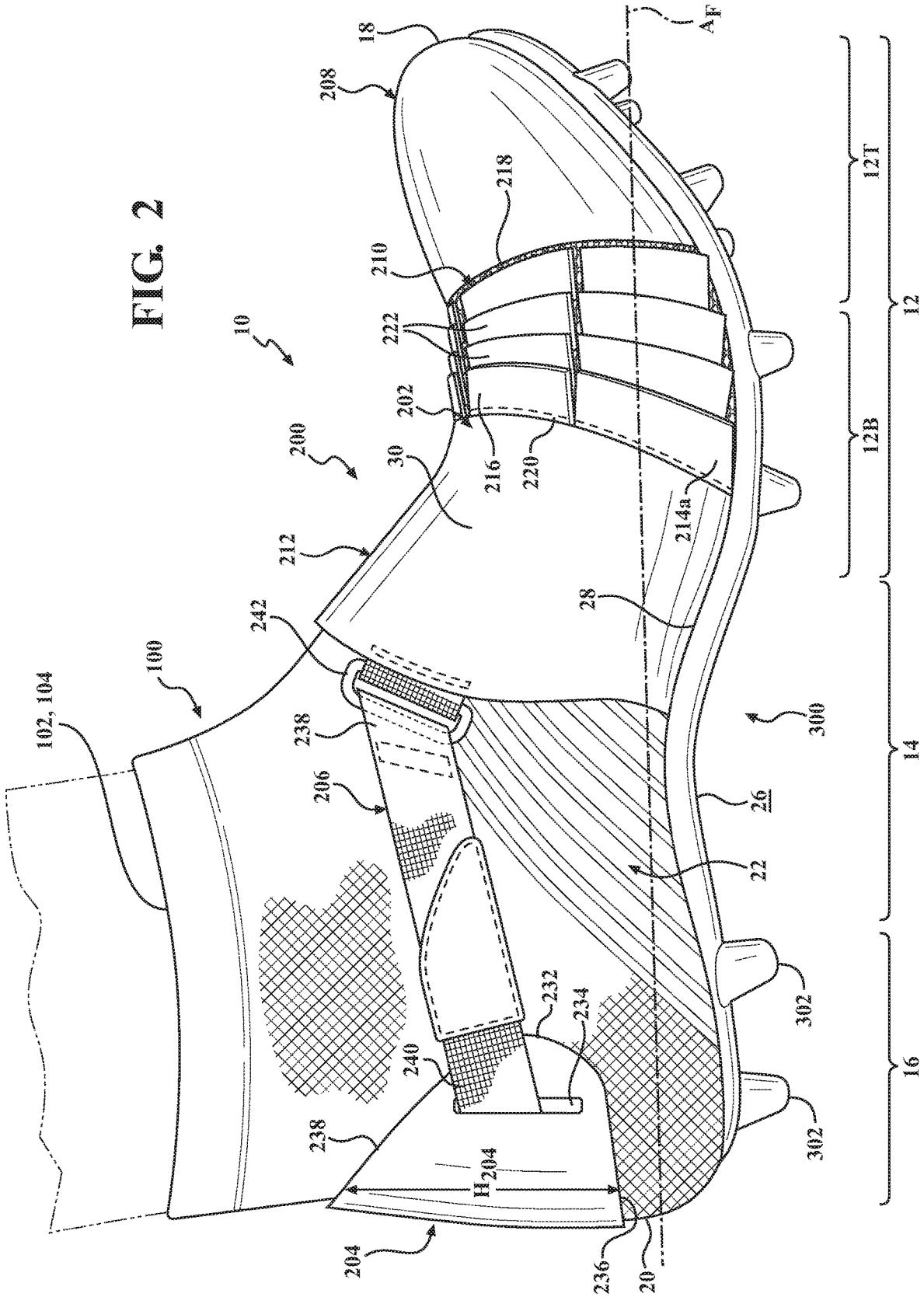
18
216
220
230d
210
218
226
228
24
214b
L_{214a}

FIG. 2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222
202
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30
216
220
214a
212
242
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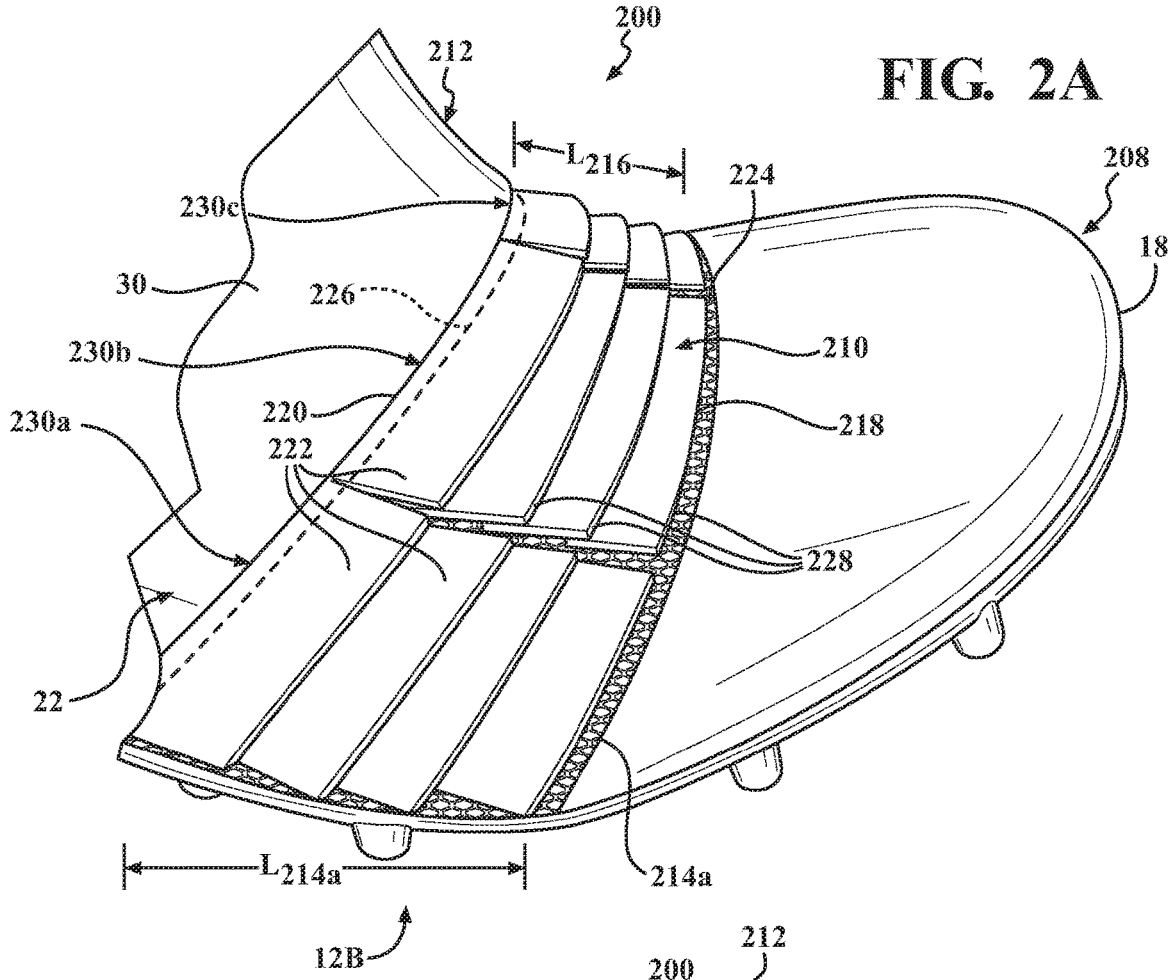
102, 104
238
206
26
22
300
232
234
240
238
302
302
H204
204
236
20
A_F
12T
12B
12
14
16


200
212
L_{216}
224
208
230c
18
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226
230b
210
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22
L_{214a}
214a
12B

FIG. 2A

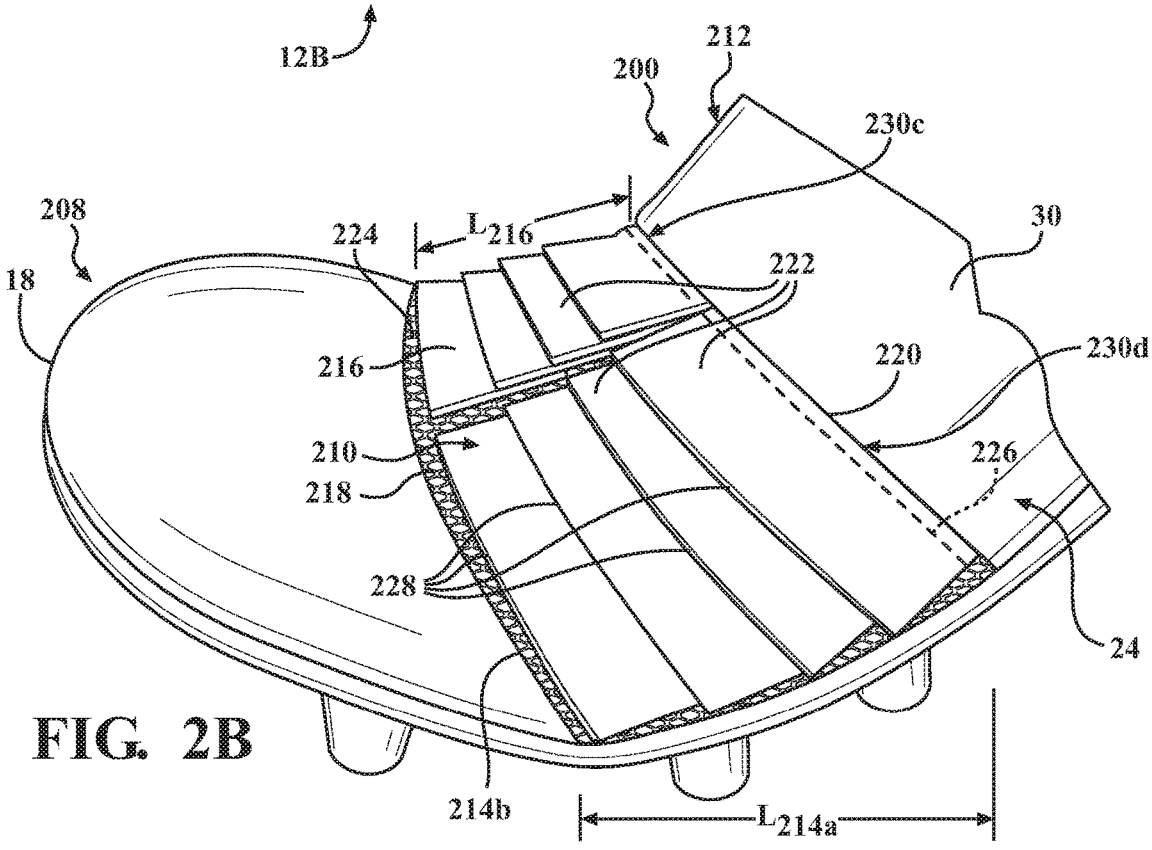
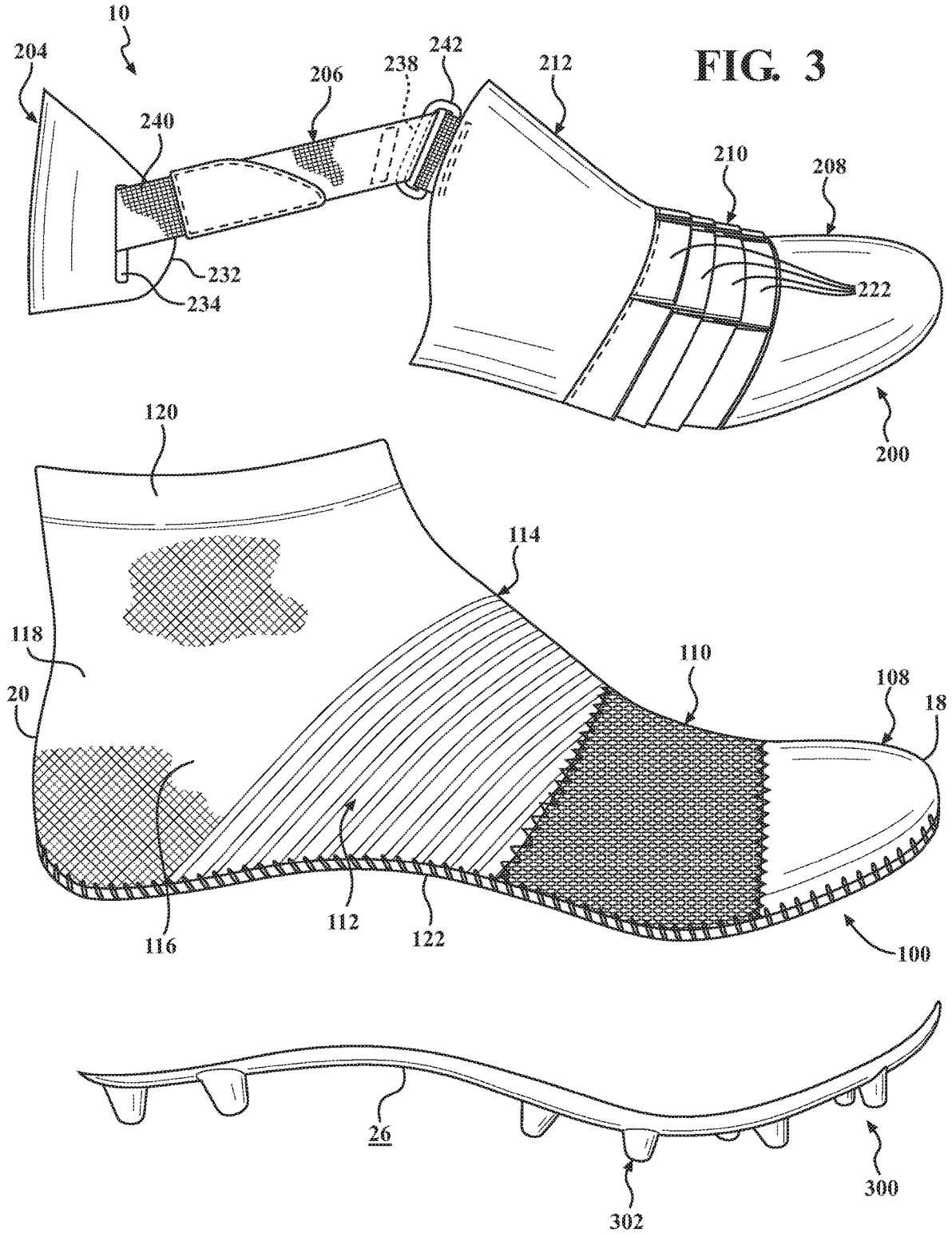

212
200
230c
208
224
L_{216}
30
18
222
216
220
230d
210
226
218
228
24
214b
L_{214a}

FIG. 2B

FIG. 3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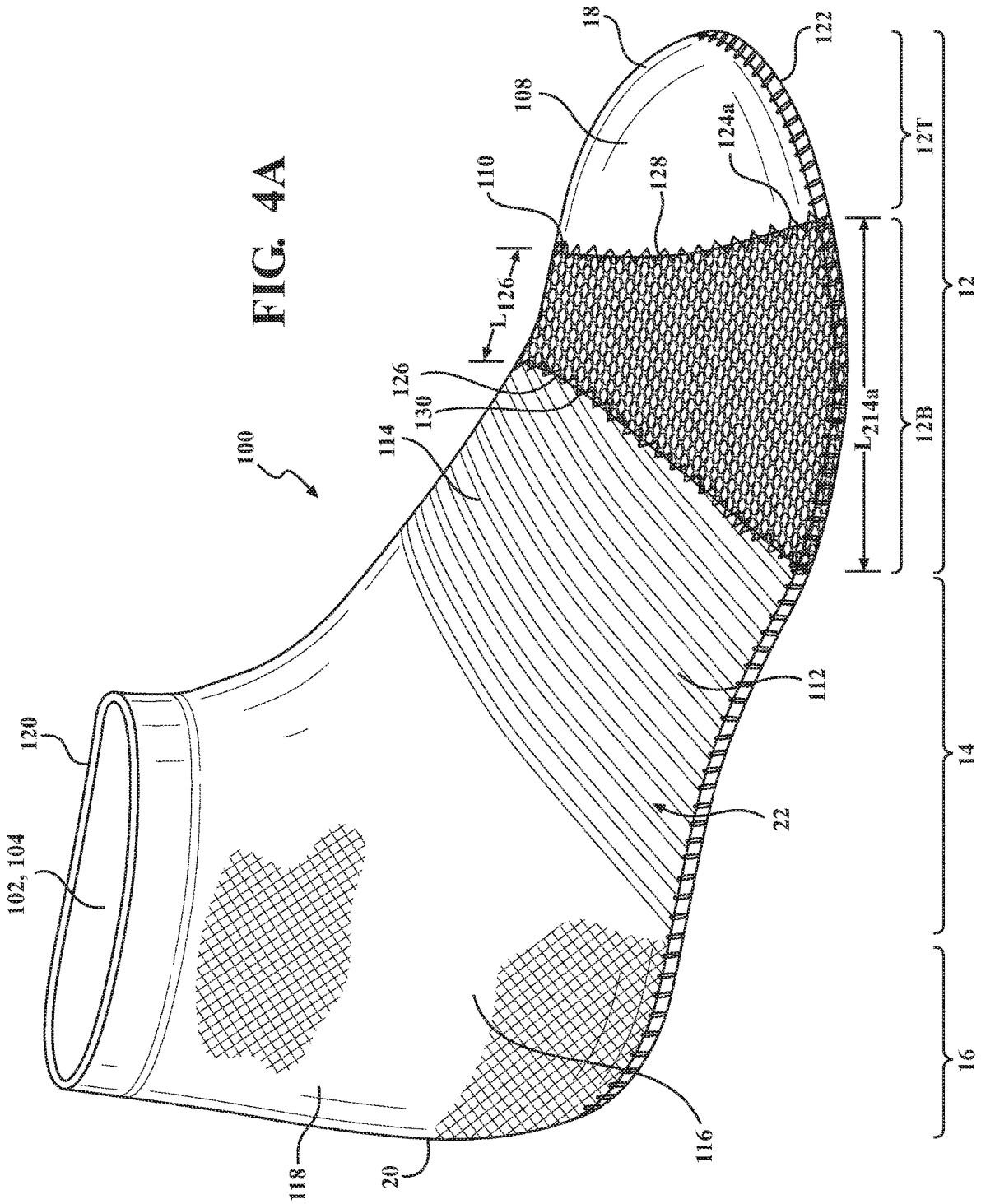
204
206
238
242
212
240
210
208
232
234
222
200
120
114
118
110
108
18
20
116
112
122
100
26
300
302

FIG. 4A


18
122
108
124a
110
128
12T
12
L_{126}
126
130
114
100
L_{214a}
12B
112
120
14
22
102, 104
16
116
118
20

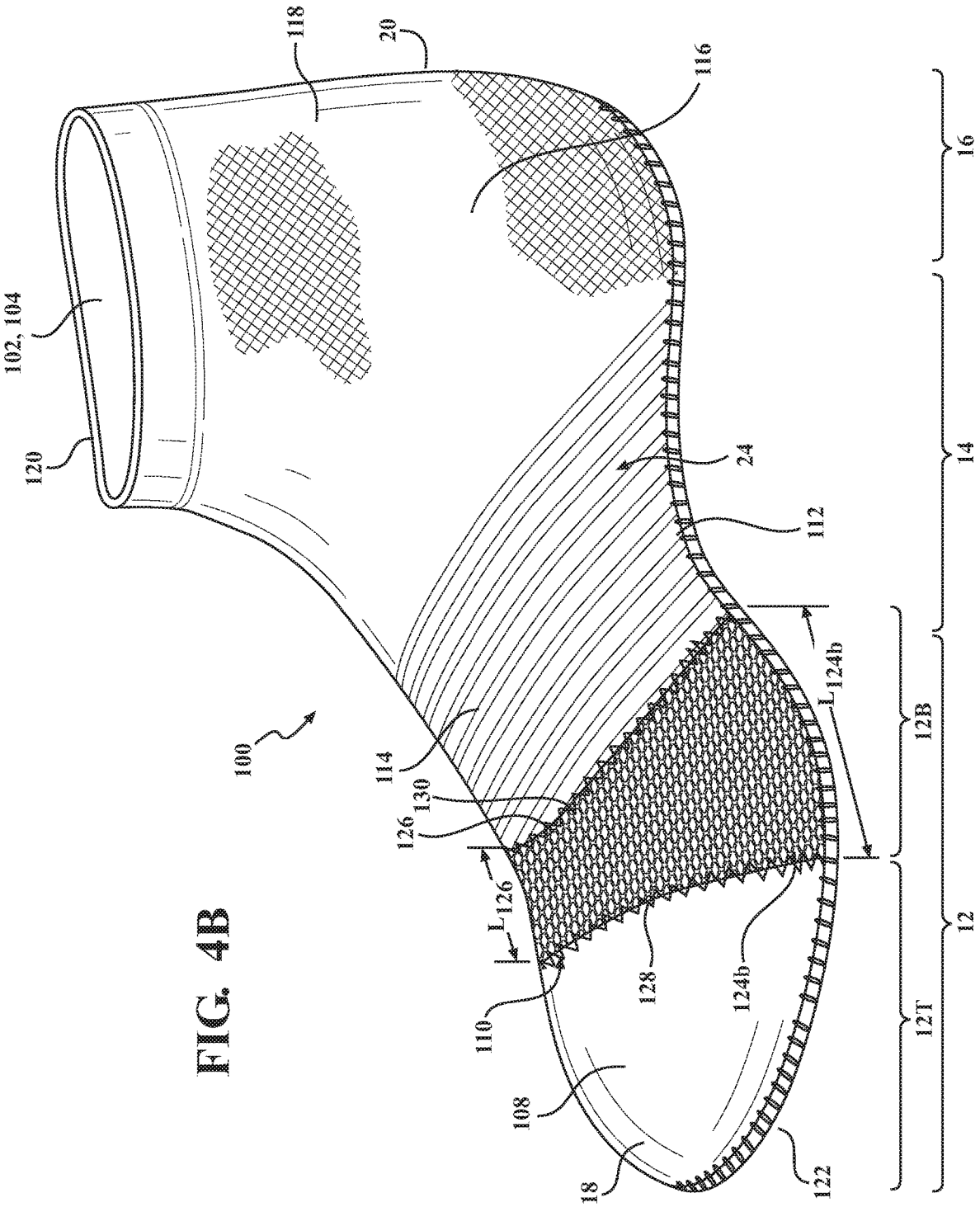

118
20
116
16
102, 104
120
24
14
112
L_{124b}
12B
100
114
130
126
L_{126}
128
124b
110
12T
12
108
18
122

FIG. 4B

PROTECTIVE UPPER FOR ARTICLE OF FOOTWEAR

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This non-provisional U.S. patent application claims priority under 35 U.S.C. § 119(e) to U.S. Provisional Patent Application Ser. No. 62/855,252, filed May 31, 2019, the disclosure of which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] This disclosure relates to an article of footwear having a protective upper.

BACKGROUND

[0003] This section provides background information related to the present disclosure which is not necessarily prior art.

[0004] Articles of footwear conventionally include an upper and a sole structure. The upper may be formed from any suitable material(s) to receive, secure and support a foot on the sole structure. A bottom portion of the upper, proximate to a bottom surface of the foot, attaches to the sole structure. The sole structure may include a layered arrangement extending between the upper and a ground-contacting surface. For example, the sole structure may include a midsole that provides cushioning during use and an outsole that provides abrasion-resistance and traction with a ground surface.

[0005] Conventional uppers are constructed of a variety of materials for providing desired characteristics of flexibility, breathability, weight, and comfort. Accordingly, uppers known in the art are typically constructed using relatively soft and/or pliable materials to maximize performance of the article of footwear. However, in activities involving periodic contact with other players, such as American football and rugby, for example, these softer materials may expose the foot of the wearer to occasional impacts. Thus, conventional uppers are designed with an eye toward balancing these often competing interests in an effort to adequately protect the foot of the wearer while concurrently maintaining desired performance characteristics.

DESCRIPTION OF DRAWINGS

[0006] FIG. **1** is a perspective view of an article of footwear according to the principles of the present disclosure, showing the article of footwear in a first configuration;

[0007] FIG. **1**A is an enlarged fragmentary view of a lateral side of a toe region of the article of footwear of FIG. **1**;

[0008] FIG. **1**B is an enlarged fragmentary view of a medial side of a toe region of the article of footwear of FIG. **1**;

[0009] FIG. **2** is a perspective view of the article of footwear of FIG. **1**, showing the article of footwear in a second configuration;

[0010] FIG. **2**A is an enlarged fragmentary view of a lateral side of a toe region of the article of footwear of FIG. **2**;

[0011] FIG. **2**B is an enlarged fragmentary view of a medial side of a toe region of the article of footwear of FIG. **2**;

[0012] FIG. **3** is an exploded view of the article of footwear of FIG. **1**;

[0013] FIG. **4**A is a lateral-side perspective view of an upper of an article of footwear according to the principles of the present disclosure; and

[0014] FIG. **4**B is a medial-side perspective view of an upper of an article of footwear according to the principles of the present disclosure.

[0015] Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

[0016] Example configurations will now be described more fully with reference to the accompanying drawings. Example configurations are provided so that this disclosure will be thorough, and will fully convey the scope of the disclosure to those of ordinary skill in the art. Specific details are set forth such as examples of specific components, devices, and methods, to provide a thorough understanding of configurations of the present disclosure. It will be apparent to those of ordinary skill in the art that specific details need not be employed, that example configurations may be embodied in many different forms, and that the specific details and the example configurations should not be construed to limit the scope of the disclosure.

[0017] The terminology used herein is for the purpose of describing particular exemplary configurations only and is not intended to be limiting. As used herein, the singular articles "a," "an," and "the" may be intended to include the plural forms as well, unless the context clearly indicates otherwise. The terms "comprises," "comprising," "including," and "having," are inclusive and therefore specify the presence of features, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, steps, operations, elements, components, and/or groups thereof. The method steps, processes, and operations described herein are not to be construed as necessarily requiring their performance in the particular order discussed or illustrated, unless specifically identified as an order of performance. Additional or alternative steps may be employed.

[0018] When an element or layer is referred to as being "on," "engaged to," "connected to," "attached to," or "coupled to" another element or layer, it may be directly on, engaged, connected, attached, or coupled to the other element or layer, or intervening elements or layers may be present. In contrast, when an element is referred to as being "directly on," "directly engaged to," "directly connected to," "directly attached to," or "directly coupled to" another element or layer, there may be no intervening elements or layers present. Other words used to describe the relationship between elements should be interpreted in a like fashion (e.g., "between" versus "directly between," "adjacent" versus "directly adjacent," etc.). As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0019] The terms first, second, third, etc. may be used herein to describe various elements, components, regions, layers and/or sections. These elements, components, regions, layers and/or sections should not be limited by these terms. These terms may be only used to distinguish one element, component, region, layer or section from another region, layer or section. Terms such as "first," "second," and other numerical terms do not imply a sequence or order

unless clearly indicated by the context. Thus, a first element, component, region, layer or section discussed below could be termed a second element, component, region, layer or section without departing from the teachings of the example configurations.

[0020] One aspect of the disclosure provides an article of footwear including an upper formed of a first material, and an armor system including a shroud covering a forefoot region of the upper. The shroud includes an articulable shroud vamp having a plurality of overlapping lames arranged in series along a ball portion of the shroud, each of the lames being formed of a second material having a greater hardness than the first material.

[0021] Implementations of the disclosure may include one or more of the following optional features. In some implementations, the shroud includes a toe cap covering a toe portion of the upper and a saddle covering a mid-foot region of the upper, the shroud vamp being disposed between the toe cap and the saddle. The saddle and the toe cap may be formed of the second material.

[0022] In some configurations, the second material is an up-cycled polyethylene composite.

[0023] In some examples, the upper includes an articulable upper vamp formed of the first material. In some configurations, the first material may have a greater elasticity than the second material.

[0024] In some configurations, the shroud vamp includes a plurality of rows of the overlapping lames. The plurality of rows may include a first row extending along a medial side of the upper and a second row extending along a lateral side of the upper.

[0025] In some implementations, each of the lames is attached to a flexible base layer. In some examples, the flexible base layer may be part of the upper.

[0026] Another aspect of the disclosure provides an article of footwear including an upper having an articulable portion formed of a first material, and an armor system including a shroud covering a forefoot region of the upper. The shroud includes a shroud vamp having a plurality of overlapping lames arranged in series and covering the articulable portion of the upper, each of the lames being formed of a second material having a greater hardness than the first material. This aspect may include one or more of the following optional features.

[0027] In some configurations, the shroud includes a toe cap covering a toe portion of the upper and a saddle covering a mid-foot portion of the upper, the shroud vamp being disposed between the toe cap and the saddle. The saddle and the toe cap may be formed of the second material.

[0028] In some examples, the second material is an up-cycled polyethylene composite.

[0029] In some examples, the articulable portion of the upper is disposed in a forefoot region. In some configurations, the first material may have a greater elasticity than the second material.

[0030] In some configurations, the shroud vamp includes a plurality of rows of the overlapping lames. The plurality of rows may further include a first row extending along a medial side of the upper and a second row extending along a lateral side of the upper.

[0031] In some implementations, each of the lames is attached to a flexible base layer. In some examples, the flexible base layer may be the articulable portion of the upper.

[0032] Referring to FIGS. **1-4**, an article of footwear **10** includes an upper **100**, an armor system **200** extending at least partially over the upper **100**, and a sole structure **300** attached to the bottom of the upper **100**. The article of footwear **10** may be divided into one or more regions. The regions may include a forefoot region **12**, a mid-foot region **14**, and a heel region **16**. The forefoot region **12** may be subdivided into a toe portion $\mathbf{12}_T$ corresponding with phalanges, and a ball portion $\mathbf{12}_B$ associated with metatarsal bones of a foot. The mid-foot region **14** may correspond with an arch area of the foot, and the heel region **16** may correspond with rear portions of the foot, including a calcaneus bone. The footwear **10** may further include an anterior end **18** associated with a forward-most point of the forefoot region **12**, and a posterior end **20** associated with a rearward-most point of the heel region **16**. A longitudinal axis A_F of the footwear **10** extends along a length of the footwear **10** from the anterior end **18** to the posterior end **20**, and generally divides the footwear **10** into a lateral side **22** and a medial side **24**. Accordingly, the lateral side **22** and the medial side **24** respectively correspond with opposite sides of the footwear **10** and extend through the regions **12**, **14**, **16**.

[0033] The sole structure **300** is attached to the bottom of the upper **100** and defines a ground-engaging surface **26** of the article of footwear **10**. As referred to throughout the application and the accompanying claims, the article of footwear **10** includes a 'bite line' **28** formed where the upper **100** and the sole structure **200** intersect when the footwear **10** is assembled. Accordingly, the bite line **28** can extend entirely around the footwear **10**.

[0034] With reference to FIGS. **4**A and **4**B, the upper **100** includes a plurality of components that cooperate to define an interior void **102** and an ankle opening **104**, which cooperate to receive and secure a foot for support on the sole structure **300**. The components of the upper **100** may be formed from one or more materials that are stitched or adhesively bonded together to define the interior void **102**. Suitable materials of the upper **100** may include, but are not limited to, textiles, foam, leather, and synthetic leather. The example upper **100** may be formed from a combination of one or more substantially inelastic or non-stretchable materials and one or more substantially elastic or stretchable materials disposed in different regions of the upper **100** to facilitate movement of the upper **100** between the tightened state and the loosened state. The one or more elastic materials may include any combination of one or more elastic fabrics such as, without limitation, spandex, elastane, rubber or neoprene. The one or more inelastic materials may include any combination of one or more of thermoplastic polyurethanes, nylon, leather, vinyl, or another material/fabric that does not impart properties of elasticity.

[0035] As shown in FIGS. **4**A and **4**B, the forefoot region **12** of the upper **100** includes a toe cap **108** disposed at the anterior end **18** and extending through the toe portion $\mathbf{12}_T$, and an upper vamp **110** disposed adjacent to the toe cap **108** and extending through the ball portion $\mathbf{12}_B$ of the forefoot region **12**. As discussed in greater detail below, the toe cap **108** may be formed of a flexible, but inelastic material, while the upper vamp **110** is formed of a flexible, elastic material and is configured to allow the forefoot region **12** of the upper **100** to bend along the ball portion $\mathbf{12}_B$.

[0036] In the mid-foot region **14**, the upper **100** includes a pair of quarter panels **112** disposed on opposite sides of the interior void **102**, and a throat **114** that extends across the top

of the upper **100** and defines an instep region **30** extending between the quarter panels **112** from the ankle opening **104** to the upper vamp **110**. In the illustrated example, the throat **114** is integrally formed of a single, continuous piece of material with the quarter panels **112**, whereby the throat extends between the opposing quarter panels in the instep region **30** to cover the interior void **102**. In some examples, the throat **114** may be formed of a material having a higher modulus of elasticity than the material forming the quarter panels **112**, thereby allowing the interior void **102** and the ankle opening **104** to expand to accommodate insertion of the foot of the wearer.

[0037] In the heel region **16**, the upper **100** may further include heel side panels **116** extending through the heel region **16** along the lateral and medial sides **22**, **24** of the ankle opening **104**. A heel counter **118** wraps around the posterior end **20** of the footwear **10** and connects the heel side panels **116**. Uppermost edges of the throat **114**, the heel side panels **116**, and the heel counter **118** cooperate to form a collar **120**, which defines the ankle opening **104** of the interior void **102**.

[0038] The upper **100** may include a strobel **122** having a bottom surface configured to oppose the sole structure **300** and an opposing top surface defining a footbed of the interior void **102**. Stitching or adhesives may secure the strobel **122** to the upper **100**. When the upper **100** is attached to the sole structure **300**, a profile of the footbed is imparted to the strobel **122** by the sole structure **300**, and may be contoured to conform to a profile of the bottom surface (e.g., plantar) of the foot. Optionally, the upper **100** may also incorporate additional layers such as an insole or sockliner that may be disposed upon the strobel **122** and reside within the interior void **102** of the upper **100** to receive a plantar surface of the foot to enhance the comfort of the article of footwear **10**.

[0039] With continued reference to FIGS. **4**A and **4**B, the upper vamp **110** forms a continuous band extending laterally across the upper **100** from a lateral end **124***a* at the strobel **122** on the lateral side **22** to a medial end **124***b* at the strobel **122** on the medial side **24**. An intermediate portion **126** of the upper vamp **110** is formed between the lateral end **124***a* and the medial end **124***b*, and extends over the instep of the upper **100**. Generally, a length of the upper vamp **110** extends longitudinally from an anterior edge **128** disposed at a boundary of the toe portion $\mathbf{12}_T$ and the ball portion $\mathbf{12}_B$, to a posterior edge **130** disposed at a boundary of the ball portion $\mathbf{12}_B$ and the mid-foot region **14**. Accordingly, as provided above, the upper vamp **110** extends through the ball portion $\mathbf{12}_B$ of the upper **100** with the anterior edge **128** attached to the toe cap **108** and the posterior edge **130** attached to the quarter panels **112** and the throat **114**. In the illustrated example, the length of the upper vamp **110** tapers continuously from an end length L_{124a}, L_{124b} at each of the lateral end **124***a* and the medial end **124***b* to an intermediate length L**126** at the intermediate portion **126** having a length L_{126} that is less than the end lengths L_{124a}, L_{124b}. In some examples, each of the end lengths L_{124a}, L_{124b} and the intermediate length L_{126} may be the same. In other examples, the end lengths L_{124a}, L_{124b} may be different from each other.

[0040] With continued reference to FIGS. **4**A and **4**B, the upper vamp **110** of the upper **100** forms a region of the upper **100** having a relatively high degree of flexibility. Accordingly, the upper vamp **110** may be formed of a different material than the other components of the upper **100**. For example, the upper vamp **110** may be formed of one of the elastic materials, such as an elastic fabric. Additionally or alternatively, the upper vamp **110** may be formed using a different construction than the remainder of the upper **100**. For example, the upper vamp **110** may be formed of a thinner material than the adjacent portions of the upper **100** (e.g., the toe cap **108** and the quarter panels **112**).

[0041] By forming the upper vamp **110** to have a greater degree of flexibility and resiliency than the other components of the upper **100**, the intermediate length L_{126} of the upper vamp **110** is variable between an extended length when the toes are in an extended position (e.g., flat footed) and a retracted length when the toes are in a bent position (e.g., during push-off). Thus, the end lengths L_{124a}, L_{124b} remain substantially constant along the bite line **28**, while the intermediate portion **126** of the upper vamp **110** can be easily flexed between the extended position and the retracted position.

[0042] Referring now to FIGS. **1**-**3**, the armor system **200** includes a shroud **202** and a heel cap **204** attached to each other by a pair of adjustable straps **206**. As described in greater detail below, each of the shroud **202** and the heel cap **204** includes materials that are configured to provide a protective layer over the exterior of the upper **100**. Furthermore, the shroud **202** includes an articulable portion configured to allow the toe portion $\mathbf{12}_T$ of the shroud **202** and the article of footwear **10** to move freely between an extended position, shown in FIGS. **1**-**1**B, and a bent position, shown in FIGS. **2**-**2**B.

[0043] The shroud **202** and the heel cap **204** may both be at least partially formed from materials that have a greater hardness than the materials forming the upper **100**, thereby providing a degree of protection to the exterior of the article of footwear **10**. For example, the shroud **202** and the heel cap **204** may be formed of a rigid or semi-rigid polymeric or composite material. In other examples, the shroud **202** and/or the heel cap **204** may be formed of a flexible material such as, for example, natural or synthetic leather. While these components **202**, **204** may be formed of a flexible material, these components **202**, **204** may still include a relatively low modulus of elasticity when compared to the materials forming the upper **100**. Regardless of the elasticity of the shroud **202** and the heel cap **204**, one or both of these components **202**, **204** may include one or more layers of padding.

[0044] The shroud **202** may be described as including a toe cap **208**, a shroud vamp **210**, and a saddle **212**. The toe cap **208** is disposed over and covers the toe cap **108** of the upper **100**. Likewise, the shroud vamp **210** of the shroud **202**, as described in greater detail below, is disposed over the upper vamp **110** of the upper **100**. The saddle **212** corresponds to and covers the quarter panels **112** and the throat **114** of the upper **100**. Accordingly, the shroud vamp **210** is interposed between the toe cap **208** and the saddle **212**, and is configured to provide an articulable joint between the toe cap **208** and the saddle **212**.

[0045] In the illustrated example, the shroud vamp **210** forms a continuous band extending laterally across the shroud **202** from a lateral end **214***a* (FIGS. **1**A and **2**A) at the bite line **28** on the lateral side **22** to a medial end **214***b* (FIGS. **1**B and **2**B) at the bite line **28** on the medial side **24**. An intermediate portion **216** of the shroud vamp **210** is formed between the lateral end **214***a* and the medial end **214***b*, and extends over the instep region **30** of the upper **100**.

Generally, a length of the shroud vamp **210** extends longitudinally from an anterior edge **218** disposed at a boundary of the toe portion $\mathbf{12}_T$ and the ball portion $\mathbf{12}_B$, to a posterior edge **220** disposed at a boundary of the ball portion $\mathbf{12}_B$ and the mid-foot region **14**. Accordingly, as provided above, the shroud vamp **210** extends through the ball portion $\mathbf{12}_B$, whereby the anterior edge **218** is attached to the toe cap **208** and the posterior edge **220** is attached to the saddle **212**. In the illustrated example, the length of the upper vamp **110** tapers continuously from an end length L_{214a}, L_{214b} located at the lateral end **214***a* and the medial end **214***b*, respectively, to an intermediate length L_{216} at the intermediate portion **216**, whereby the intermediate length L_{216} is less than the end lengths L_{214a}, L_{214b}. In some examples, the end lengths L_{214a}, L_{214b} and the intermediate length L_{216} may be same. In other examples, the end lengths L_{214a}, L_{214b} may be different from each other.

[0046] With continued reference to FIG. **1**-**2**B, the shroud vamp **210** forms a region of the shroud having a relatively high degree of flexibility. However, unlike the upper vamp **110**, which is formed of a single piece of material having a relatively high degree of flexibility and elasticity, the shroud vamp **210** is formed of a plurality of rigid, overlapping lames **222** attached to a flexible and elastic base layer **224**. The lames **222** are arranged in series from the anterior edge **218** to the posterior edge **220** of the shroud vamp **210**. Here, the overlapping ones of the lames **222** are configured to move relative to each other along the direction of the longitudinal axis A_F to allow the shroud vamp **210** to move between an extended position (FIGS. **1**-**1**B) and a retracted position (FIGS. **2**-**2**B) while providing a continuous covering of the protective material. In some examples, the flexible base layer **224** may be the upper vamp **110**, whereby the lames **222** are attached directly to the upper shroud **110**. In other examples, the flexible base layer **224** may be formed as part of the shroud **202**, separately from the upper vamp **110**.

[0047] Referring to FIGS. **1**A and **1**B, lateral and medial sides **22**, **24** of the shroud vamp **210** are shown with the shroud vamp **210** in an extended position. As shown, lengths of each of the lames **222** extend in a direction along the longitudinal axis A_F from an attached proximal end **226** to a detached distal end **228**. The lames **222** are arranged in a layered, overlapping configuration along the direction of the longitudinal axis A_F from the posterior edge **220** to the anterior edge **218**, whereby the proximal end **226** of a first one of the lames **222** in the series is attached at the posterior edge **220** of the shroud vamp **210**, and a next one of the lames **222** has a proximal end **226** attached to the base layer **224** beneath the first one of the lames **222** (i.e., between the proximal end **226** and the distal end **228** of the first lame **222**). Successive lames **222** are provided in a similar fashion to cover the base layer **224** with the distal end **228** of a final one of the lames **222** in the series being disposed adjacent to the anterior edge **218** of the shroud vamp **210**.

[0048] Although the lames **222** of the illustrated example are shown as having a forward-extending arrangement, where respective proximal ends **226** face the posterior end **20** and distal ends **228** face the anterior end **18**, the lames **222** may be arranged in an opposite, rearward-facing manner. For example, a first one of the lames **222** may extend from the proximal end **226** attached at the anterior edge **218** of the shroud vamp **210** to a detached distal end **228** closer to the posterior edge **220**. As discussed above, successive ones of the lames **222** are then provided with proximal ends **226** disposed beneath the preceding lame **222** and distal ends **226** projecting rearwardly therefrom until a final one of the lames **222** is provided with the distal end **226** adjacent to the posterior edge **220** of the shroud vamp **210**. Additionally or alternatively, one or more of the rows **230***a*-**230***b* may have a forward-facing arrangement, while others of the rows have a rearward-facing arrangement.

[0049] With continued reference to FIGS. **1**A and **1**B, the lames **222** of the shroud vamp **210** are arranged in a plurality of rows **230***a*-**230***d*, each including a series of the lames **222** extending from the posterior edge **220** to the anterior edge **218**. The lames **222** of the plurality of rows **230***a*-**230***d* are independently movable relative to each other within the respective rows **230***a*-**230***d* and relative to lames **222** located in different rows **230***a*-**230***d*. For example, lames **222** located in row **230***a* are independently movable relative to one another and are independently movable relative to lames **222** located in each of rows **230***b*-**230***d*.

[0050] Referring to FIG. **1**A, a width of a first one of the rows **230***a* extends from the bite line **28** to the instep region **30** on the lateral side **22**. A second one of the rows **230***b* is adjacent to the first one of the rows **222***a*, and has a width extending through the instep region **30** on the lateral side **22**. A third row **230***c* of the lames **222** is disposed adjacent to the second row **230***b* and extends along the instep region **30** on the medial side **24**, and a fourth row **230***d* of the lames **222** extends from the instep region **30** on the medial side **24** to the bite line **28** on the medial side **24**, as shown in FIG. **1**B. The lames **222** forming each row **230***a*-**230***b* may be uniquely contoured to conform to the profile of the top of the foot.

[0051] Although four rows **230***a*-**230***d* of lames **222** are shown in the illustrated example, other examples may include different numbers of rows. In some examples, a single row of lames **222** may extend continuously from the bite line **28** on the lateral side **22** to the bite line **28** on the medial side **24**, whereby each of the lames **222** is curved over the instep region **30** of the upper **100**. In other examples, a plurality of substantially straight or flat lames **222** may be arranged in a desired number of rows to cover the upper vamp **110**.

[0052] As shown in FIGS. **1**-**2**B, when the toe portion $\mathbf{12}_T$ of the article of footwear **10** is moved between the extended position (FIGS. **1**-**1**B) and the bent position (FIGS. **2**-**2**B), the overlap between adjacent ones of the lames **222** in each row **230***a*-**230***b* will move between an extended configuration and a retracted configuration. For example, as shown in FIGS. **1**-**1**B, when the toe portion $\mathbf{12}_T$ is in the extended position, the overlap between adjacent ones of the lames **222** will be minimized such that a greater portion of each lame **222** is exposed. Simultaneously, the base layer **224** will be in an extended or stretched position. Conversely, when the toe portion $\mathbf{12}_T$ is moved into the bent position, the overlap between adjacent ones of the lames **222** will be increased compared to the extended position such that less of each lame **222** is exposed, as shown in FIGS. **2**-**2**B. Accordingly, the overlapping arrangement of the lames **222** allows the intermediate length L_{216} of the shroud vamp **210** to change freely, while maintaining a continuous covering of the protective lames **222**.

[0053] Referring again to FIG. **1**, the heel cap **204** is formed of a rigid or semi-rigid material, and extends around the heel counter **118** of the upper **100** from a first end **232**

on the lateral side **22** to a second end (not shown) on the medial side **24**. Because the first end **232** and the second end of the heel counter **118** are substantially identical, only the first end **232** is shown and described herein. The first end **232** and the second end are each attached to the shroud **202** by one of the straps **206**. In the illustrated example, each end **232** includes a slot **234** through which the strap **206** is routed. In other examples, the straps **206** may be attached to the ends **232** by independent fasteners, such as snaps, buttons, hooks, adhesives, hook-and-loop fabrics, or the like.

[0054] Generally, the heel cap **204** is configured to provide protection to the Achilles region of the ankle and may be formed from the same material as the shroud **202**. Accordingly, the heel cap **204** extends from a lower edge **236** adjacent to the heel to an upper edge **238** extending around the Achilles region. A height H**204** of the heel cap **204** may taper from an intermediate portion at the posterior end **20** of the upper **100** to each of the ends **232**. Accordingly, one or both of the lower and upper edges **236**, **238** may extend along an arcuate path from the first end **232** to the second end.

[0055] As discussed above, the shroud **202** and the heel cap **204** are formed of rigid or semi-rigid materials to provide a degree of protection to the upper **100** of the footwear, particularly in regions of the foot where localized impacts are likely to occur. Although the shroud **202** and the heel cap **204** may be formed of any rigid or semi-rigid material, such as polymeric materials and composites, the shroud **202** and the heel cap **204** of the illustrated example are formed from an up-cycled polyethylene composite material, referred to hereinafter as the "armored material." Initially, the polyethylene for the armored material may be provided by shredding previously used garments including polyethylene threads, such as athletic jerseys. The shredded polyethylene is then processed to form a woven polyethylene fabric sheet, which is casted in a thermoformed resin to form sheets of the armored material. The armored material can then be laser cut to form component blanks corresponding to the toe cap **208**, the lames **222** of the shroud vamp **210**, the saddle **212**, and the heel cap **204**. The respective blanks are then heat formed into the desired shape to provide the finished components **204**, **208**, **212**, **222**, which are assembled to the article of footwear **10** to provide the armor system **200**.

[0056] Referring again to FIG. **1**, the armor system **200** may include a pair of the straps **206**, with a first one of the straps **206** connecting the shroud **202** to the heel cap **204** on the lateral side **22** and a second one of the straps (not shown) connecting the shroud **202** to the heel cap **204** on the medial side **24**. Accordingly, each strap **206** extends from a first end **238** attached to the saddle **212** to a second end **240** attached to one of the ends **232** of the heel cap **204**. At least one of the ends **238**, **240** may be adjustable to control an overall length of the strap **206**. In the illustrated example, the first end **238** includes a buckle **242** attached at a posterior edge of the saddle **212**, while the second end **240** is looped through the slot **234** and folded over upon itself to adjust an overall length of the strap **206**. Accordingly, the second end **240** of the strap **206** may include a fastener, such as hook-and-loop fabric or snaps, for securing the second end **240** of the strap **206** to an intermediate portion of the strap **206**. The adjustability of the strap **206** allows a fit of the armor system **200** to be adjusted around the foot to secure the footwear **10** to the foot.

[0057] As provided above, the sole structure **300** is attached to the bottom of the upper **100** and defines the ground-engaging surface **26** of the article of footwear **10**. In some examples, the sole structure **300** may be formed of a relatively hard polymeric material, and includes a plurality of ground engaging features **302**, such as studs or cleats, configured to interface with the ground surface. While the armor system **200** is described and shown in conjunction with a sole structure **300** having studs or cleats, the aforementioned upper **100** and armor system **200** may be used in combination with cushioning sole structures and/or sole structures without such ground-engaging features.

[0058] The following Clauses provide an exemplary configuration for an article of footwear described above.

[0059] Clause 1: An article of footwear comprising an upper formed of a first material, and an armor system including a shroud covering a forefoot region of the upper, the shroud including an articulable shroud vamp having a plurality of overlapping lames arranged in series along a ball portion of the shroud, each of the lames being formed of a second material having a greater hardness than the first material.

[0060] Clause 2: The article of footwear of Clause 1, wherein the shroud includes a toe cap covering a toe portion of the upper and a saddle covering a mid-foot region of the upper, the shroud vamp being disposed between the toe cap and the saddle.

[0061] Clause 3: The article of footwear of Clause 2, wherein the saddle and the toe cap are formed of the second material.

[0062] Clause 4: The article of footwear of Clause 1, wherein the second material is an up-cycled polyethylene composite.

[0063] Clause 5: The article of footwear of Clause 1, wherein the upper includes an articulable upper vamp formed of the first material.

[0064] Clause 6: The article of footwear of Clause 5, wherein the first material has a greater elasticity than the second material.

[0065] Clause 7: The article of footwear of Clause 1, wherein the shroud vamp includes a plurality of rows of the overlapping lames.

[0066] Clause 8: The article of footwear of Clause 7, wherein the plurality of rows includes a first row extending along a medial side of the upper and a second row extending along a lateral side of the upper.

[0067] Clause 9: The article of footwear of Clause 1, wherein each of the lames is attached to a flexible base layer.

[0068] Clause 10: The article of footwear of Clause 9, wherein the flexible base layer is part of the upper.

[0069] Clause 11: An article of footwear comprising an upper having an articulable portion formed of a first material, and an armor system including a shroud covering a forefoot region of the upper, the shroud including a shroud vamp having a plurality of overlapping lames arranged in series and covering the articulable portion of the upper, each of the lames being formed of a second material having a greater hardness than the first material.

[0070] Clause 12: The article of footwear of Clause 11, wherein the shroud includes a toe cap covering a toe portion

of the upper and a saddle covering a mid-foot portion of the upper, the shroud vamp being disposed between the toe cap and the saddle.

[0071] Clause 13: The article of footwear of Clause 12, wherein the saddle and the toe cap are formed of the second material.

[0072] Clause 14: The article of footwear of Clause 11, wherein the second material is an up-cycled polyethylene composite.

[0073] Clause 15: The article of footwear of Clause 11, wherein the articulable portion of the upper is disposed in a forefoot region.

[0074] Clause 16: The article of footwear of Clause 11, wherein the first material has a greater elasticity than the second material.

[0075] Clause 17: The article of footwear of Clause 11, wherein the shroud vamp includes a plurality of rows of the overlapping lames.

[0076] Clause 18: The article of footwear of Clause 17, wherein the plurality of rows includes a first row extending along a medial side of the upper and a second row extending along a lateral side of the upper.

[0077] Clause 19: The article of footwear of Clause 11, wherein each of the lames is attached to a flexible base layer.

[0078] Clause 20: The article of footwear of Clause 19, wherein the flexible base layer is the articulable portion of the upper.

[0079] The foregoing description has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. Individual elements or features of a particular configuration are generally not limited to that particular configuration, but, where applicable, are interchangeable and can be used in a selected configuration, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the disclosure, and all such modifications are intended to be included within the scope of the disclosure.

1. An article of footwear comprising:

an upper formed of a first material; and

an armor system including a shroud covering a forefoot region of the upper, the shroud including an articulable shroud vamp having a plurality of overlapping lames arranged in series along a ball portion of the shroud, each of the lames being formed of a second material having a greater hardness than the first material.

2. The article of footwear of claim **1**, wherein the shroud includes a toe cap covering a toe portion of the upper and a saddle covering a mid-foot region of the upper, the shroud vamp being disposed between the toe cap and the saddle.

3. The article of footwear of claim **2**, wherein the saddle and the toe cap are formed of the second material.

4. The article of footwear of claim **1**, wherein the second material is an up-cycled polyethylene composite.

5. The article of footwear of claim **1**, wherein the upper includes an articulable upper vamp formed of the first material.

6. The article of footwear of claim **5**, wherein the first material has a greater elasticity than the second material.

7. The article of footwear of claim **1**, wherein the shroud vamp includes a plurality of rows of the overlapping lames.

8. The article of footwear of claim **7**, wherein the plurality of rows includes a first row extending along a medial side of the upper and a second row extending along a lateral side of the upper.

9. The article of footwear of claim **1**, wherein each of the lames is attached to a flexible base layer.

10. The article of footwear of claim **9**, wherein the flexible base layer is part of the upper.

11. An article of footwear comprising:

an upper having an articulable portion formed of a first material; and

an armor system including a shroud covering a forefoot region of the upper, the shroud including a shroud vamp having a plurality of overlapping lames arranged in series and covering the articulable portion of the upper, each of the lames being formed of a second material having a greater hardness than the first material.

12. The article of footwear of claim **11**, wherein the shroud includes a toe cap covering a toe portion of the upper and a saddle covering a mid-foot portion of the upper, the shroud vamp being disposed between the toe cap and the saddle.

13. The article of footwear of claim **12**, wherein the saddle and the toe cap are formed of the second material.

14. The article of footwear of claim **11**, wherein the second material is an up-cycled polyethylene composite.

15. The article of footwear of claim **11**, wherein the articulable portion of the upper is disposed in a forefoot region.

16. The article of footwear of claim **11**, wherein the first material has a greater elasticity than the second material.

17. The article of footwear of claim **11**, wherein the shroud vamp includes a plurality of rows of the overlapping lames.

18. The article of footwear of claim **17**, wherein the plurality of rows includes a first row extending along a medial side of the upper and a second row extending along a lateral side of the upper.

19. The article of footwear of claim **11**, wherein each of the lames is attached to a flexible base layer.

20. The article of footwear of claim **19**, wherein the flexible base layer is the articulable portion of the upper.

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